REMARKS

This amendment is a response to the Examiner's Answer mailed December 11, 2008. With the entry of this Amendment, Claims 1-28 are pending in the present application, of which claims 1, 13 and 20 are in independent form. Claims 1, 8, 11, 13, 16, 17, 20 and 24 are amended without adding new matter. Support for the amended matter can be found at least in paragraphs 24 and 32 of the present application as published under U.S. Patent Publication No. 20040252863 A1.

I. REJECTION OF CLAIMS UNDER 35 U.S.C. § 101

The Examiner has rejected claims 1-12 under 35 U.S.C. 101 as allegedly not falling within one of the four statutory categories of invention. Specifically, the Examiner alleges that independent claim 1 discloses a "method/process" which is not tied to another statutory category, and thus does not qualify as a statutory process. Further, the Examiner has also rejected claims 2-12 under 35 U.S.C. 101 as depending from rejected independent claim 1.

Independent claim 1 is amended to overcome this rejection. Thus, this rejection of claims 1-12 under 35 U.S.C. 101 is now obviated.

II. REJECTION OF CLAIMS 1-5, 7, 13-14, 16 AND 20-22

The Examiner has rejected claims 1-5, 7, 13,14, 16, 20-23 under 35 U.S.C. § 102(b) as allegedly being anticipated by Franke et al., Autonomous Driving Goes Downtown, IEEE Intelligent Systems, 1998 (hereinafter "*Franke*").

Applicants assert that independent claims 1, 13 and 20 are patentable over *Franke* because Applicants contend that *Franke* discloses a different method, system and computer readable medium, respectively, from what is claimed in claims 1, 13 and 20. "A prior art reference anticipates a claim only if the reference discloses, either expressly or inherently, every limitation of the claim.... Absence from the reference of any claimed element negates anticipation." Rowe v. Dror, 112 F3.3d 473, 478, 42 USPQ2d 1550 Fed. Cir. (1997) (internal citations omitted). Applicants submit that *Franke* does not disclose, teach or suggest all the limitations of claim 1. In general, Applicants contend that *Franke* does not disclose a method of detecting an imminent collision claimed in claims 1, 13 and 20. Specifically, Applicants contend that *Franke* does not disclose the method of detecting an imminent collision that includes producing from imagery a depth map wherein each pixel in the depth map has associated 3D position data and classifying a selected plurality of patches of the depth map into a plurality of classes based on the 3D position data as claimed in claims 1, 13 and 20.

First, *Franke* does not describe a depth map that has associated **3D position data**. *Franke* describes producing a **2D depth map** from a disparity image. See page 41, column 3 and figures 2 and 4 of *Franke*. However, *Franke* fails to teach or suggest providing a 3D position data for each pixel in the depth map. *Franke* simply teaches generating a depth map that provides a lateral position of detected objects. *Franke* is simply not concerned with any 3D position data for the pixels in the depth map.

Next, *Franke* does not describe classifying patches of a depth map. The Examiner contends that *Franke* discloses classifying a plurality of patches of a depth map into a plurality of classes. For this, the Examiner points to *Franke*, which describes that a system can "detect and classify different additional traffic participants, such as bicyclists or pedestrians" (*Franke* at page 41, column 1), that a "polynomial classifier subsequently classifies detected lane boundaries such as curbs, markings or [a] clutter" (*Franke* at page 43, column 1), and "[t]he classifications stages [involve] color, shape and pixel values" (*Franke* at page 44, column 2). In none of these

sections, however, does *Franke* disclose classifying **patches of a depth map** into a plurality of classes based on the **3D position data** as will be described in greater detail below.

When *Franke* describes a system to "detect and classify different additional traffic participants, such as bicyclists or pedestrians," *Franke* is describing tasks to be performed to build a system without any teaching or suggestion of how to implement this task. This portion of *Franke* does not describe classifying patches of a depth map. When *Franke* describes that a "polynomial classifier subsequently classifies detected lane boundaries such as curbs, markings or clutter," *Franke* is simply disclosing using a polynomial method to classify the features detected on a road which includes identifying the target types in the region of interest and rejecting any clutter and background. As known to those of skill in the art, a polynomial classifier is defined as a method of grouping objects into one or more groups, or classes, based on the best-fit of a parameterized polynomial equation to the observed data. Again, this portion of *Franke* involves classifying polynomials of an image, not a depth map. As is known to those of skill in the art, an image consists of pixels, that is, picture elements of the imaged scene, whereas a depth map consists of values associating points of the imaged scene with their corresponding depth values. Clearly, the polynomial classifier as disclosed in *Franke* fails to teach or suggest **classifying patches** of a **depth map** into a plurality of classes **based on the 3D position data**. Franke also describes that "classification, is done with an RBF classifier in [a] multi stage process," and that "a color-normalized pictograph [is] extracted from the original image," wherein the "classifications stages involve color, shape and pixel values." As known to those of skill in the art, a RBF classifier is a radial basis function classifier which is defined as a real-valued function whose value depends on the distance from an origin. The RBF classifier as disclosed in *Franke* classifies a pictograph from an original image. As known to one skilled in the art, a pictograph is a simplified representation of an object in an original image, such as a stick figure, whereas a depth map consists of values associating points of the imaged scene with their corresponding depth values. So, again, *Franke* describes classifying a pictograph from an image, but not classifying **patches** of a **depth map based on the 3D position data**. Thus,

Franke fails to teach or suggest any type of classifying of the depth map including classifying patches of a depth map **based on the 3D position data**. Therefore, the cited portions of *Franke* cannot support the Examiner's rejection of claim 1.

On the contrary, as discussed above, *Franke* does not describe classifying patches of a depth map, but instead teaches a system in which classification is performed on an entire image. Note that on page 41, column 2, *Franke* teaches that a "feature-based approach classifies each pixel according to gray values of its four direct neighbors." Thus, *Franke* teaches classification of an entire image of the scene (figure 1 of *Franke*) by classifying each pixel in the image. Whereas, in the present application, <u>a plurality of **patches** of the **depth map** are classified</u>, as recited in amended independent claim 1, 13 and 20. Further, these images of *Franke* are stereo images and not a depth map as claimed in the present invention. See page 41, column 2 and Figure 1 of *Franke*. As is known to those of skill in the art, a stereo image is a pair of images taken of a single scene by two cameras, whose relative orientation is typically pre-determined by calibration. One skilled in the art understands that the stereo image is not same as the depth map, which, as discussed above, is a 2-dimensional array of values (sometimes also called a depth image, range map or range image), each point of which represents to a point in a scene. While *Franke* does separately describe a depth map, *Franke* does not describe **classifying patches** of a depth map **based on the 3D position data**. Instead, after classification of the stereo image, *Franke* describes extracting structures from the image to recognize road boundaries and then removing all features on the road plane to generate a 2-dimensional depth map containing the remaining features including the objects that are subsequently tracked. (See page 41, columns 2 and 3 and page 42, column 1 of *Franke*). Thus, *Franke* describes classifying an image, removing objects from the image, and then creating a depth map, but *Franke* does not describe classifying portions of a depth map **based on the 3D position data**. Clearly, *Franke* does not describe any classifying of the depth map, let alone <u>classifying a plurality of patches of the depth map based on the 3D position data</u>.

Moreover, in the present application, only parts (selected patches) of the depth map are classified, not an entire depth map. Support for this is provided in paragraphs 30 and 32 and Figures 6 and 7 of the present application. On the contrary, *Franke* teaches a system in which classification is performed on an entire image. Note that on page 41, column 2, *Franke* teaches that a "feature-based approach <u>classifies each pixel</u> according to gray values of its four direct neighbors." Thus, *Franke* teaches classification of an entire image of the scene (figure 1 of *Franke*) by classifying each pixel in the image. Whereas, in the present application, a **<u>selected</u>** <u>plurality of patches of the depth map</u> are classified, as recited in independent claims 1, 13 and 20. Thus, as claimed in the present application, only selected parts of a depth map are classified. Support for this is provided in paragraphs 30 and 32 and Figures 6 and 7 of the present application. For example, at step 706 in Figure 7, a determination is made as to whether a patch is dense enough to be used for processing and only those patches with sufficient density are selected for processing.

Therefore, the cited disclosure of *Franke* fails to meet the MPEP's requirement that "[a] claim is anticipated only if <u>each and every</u> element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." <u>Verdegaal Bros., Inc. v. Union Oil Co.</u>, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (MPEP 2131) (Emphasis Added).

In the system and method of the present invention as claimed, the depth map is first produced, which is tessellated into patches and then further classified to detect a potential threat. In contrast, *Franke* describes an application that uses a depth map and, also describes a separate and distinct application that employs object classification. Thus, *Franke* describes two separate applications, which are independent of each other. First is the **stereo-based obstacle detection and tracking** application and second is the **object recognition** application. With regard to the first system, on page 40, column 2, *Franke* describes a system that "includes stereo vision for depth-based obstacle detection and tracking and a framework for monocular detection and recognition of relevant objects." Also, on page 46, column 2 to column 3, *Franke* recites two

methods of detection as "[c]olor clustering on monocular images in a combined color and position feature space" and "3D segmentation on stereo vision." As is known to those of skill in the art, a monocular image is one image taken of a single scene by a single camera. This detection of the monocular image does not provide the depth perception of the image. One skilled in the art understands that a monocular image is not the same as a stereo image, which, as discussed above, is a pair of images taken of a single scene by two cameras, whose relative orientation is typically pre-determined by calibration. This clearly indicates that the **object recognition** of one section of *Franke* does not utilize the stereo depth map of **obstacle detection** of another separate section of *Franke* since it is monocular. So, the steps of **object recognition** do not occur subsequent to the disparity image created for **obstacle detection and tracking**. Therefore, while *Franke* does describe both object detection and the use of a depth map, these features are not described as being part of the same system, but instead, are described as being separate and distinct. Thus, the depth map described by *Franke* is not 'arranged as in that claim' as recited by claim 1 of the present application. Also, "Anticipation under Section 102 requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in that claim" quoting <u>Connell vs. Sears, Roebuck & Co</u>. 772 F.2d 1542, 1548, 220 USPQ 193, 198 (Fed. Cir. 1983). Furthermore,

> the meaning of the expression, 'arranged as in the claim' is readily understood in relation to claims drawn to things such as ingredients mixed in some claimed order. In such instances, a reference that discloses all of the claimed ingredients, but not in the order claimed, would not anticipate, because the reference would be missing any disclosure of the limitations of the claimed invention 'arranged as in the claim.' But the 'arranged as in the claim' requirement is not limited to such a narrow set of 'order of limitations' claims. Rather, our precedent informs that the 'arranged as in the claim' requirement applies to all claims and refers to the need for an anticipatory reference

> to show all of the limitations of the claims arranged or combined in the same way as recited in the claims, not merely in a particular order. The test is thus more accurately understood to mean 'arranged or combined in the same way as in the claim'. See Net MoneyIn Inc. vs. Verisign, Inc. 545 F.3d 1359, 1360 (Fed. Cir. 2008).

The above discussion shows features of claims 1, 13 and 20 are not disclosed or suggested by *Franke* Thus, for any one of the several reasons discussed above, it is believed that *Franke* fails to anticipate the invention of claims 1, 13 and 20 under 35 USC § 102(b) and request withdrawal of this rejection. Applicants' further request withdrawal of the rejection of dependent claims 2-5, 7, 14, 16-19 and 21-22 at least because such claims depend directly or indirectly from such parent claims 1, 13 and 20, which are believed patentable.

III. Rejection of Claims 6, 15 and 23

Claims 6, 15 and 23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Franke* as applied to claims 1, 13 and 20 above, and further in view of *Yang*. Applicants respectfully disagree.

The rejection of such claims was made based on an application of *Franke*, plus an additional application of *Yang* for elements that the Examiner recognizes are not disclosed by *Franke*. Applicants believe that the application of *Franke* to such claims was made in a way that is incorrect as indicated above with respect to claims 1, 13 and 20. Thus, there are still elements of the claims that are not taught or suggested by the references, even if *Franke* were to be combined with *Yang*. Thus, applicants respectfully request withdrawal of the §103 rejection of Claims 6, 15 and 23.

IV. Allowable Subject Matter

The Applicants thank the Examiner for objecting to claims 8-12, 17-19, and 24-28 as being dependent upon a rejected base claim, but deeming the claims allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

CONCLUSION

In view of the above amendment and remarks, Claims 1-28 are submitted to be allowable.

No fee is believed to be required, however, the USPTO is directed and authorized to charge all required fees to Deposit Account No. 501358. Applicant's undersigned agent may be reached at the telephone number provided below. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

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